

1720.
ASTROSCOPIMUM:
OR TWO

Hemispheres,

Containing all the Northern and Southern
CONSTELLATIONS,

Projected upon the
Poles of the World.

Which (by the help of a Movable *Horizon*) are
rendred Serviceable in any *Latitude*.

The Uses of which *Hemispheres* are Illustrated by
Variety of *EXAMPLES*.

Composed and Published by *FRANCIS LAMB.* K

To which is added the *Arabick, Chalde, Greek, Latin,*
and *English* Names of the *Constellations*, with
other things pertinent to them.

*The Heaven's a Book, the Stars are Letters fair,
God is the Writer, Men the Readers are.*

L O N D O N

Printed by *W. Leybourn*, for the Author, and are to
be sold by *R. Morden* at the *Atlas* in *Cornhil* 1673.

OF TWO

Hemphreys

Containing all the most recent
CONSTITUTIONS

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This is a list of the
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THE
PUBLISHER
TO THE
READER.

UPON the sight of
two Cœlestial Hemi-
spheres, many years
since Published by Dr. Hood,
which Hemispheres were
Projected upon the Poles of
the Ecliptick, and laid down
in two large Schemes, with
A 2 their

The Publisher to
*their description, and some few
Uses of them by him written;
which Uses were principally
such as concern the Longitude
and Latitude of Stars, refer-
ring such other as concern their
Right Ascensions, Declina-
tions, Culminations, coming
to the Meridian, Horary di-
stance, &c. to a Table to his
Treatise of the Uses of his said
Hemispheres annexed; and
divers other Problems which
are of more frequent and gene-
ral use, he wholly omits; refer-
ring such also to be Treated of
in his Astronomical Lectures*
of

the Reader.

of which he was then Publick Professor in London.

These things consider'd, together with the Paucity of these his Books and Hemispheres, and knowing also what other good Tables have been since his time produced from the good Observations of the Noble Tycho, of the Longitudes and Latitudes of the Fixed Stars, and from them, their Right Ascensions and Declinations exactly Calculated for the Year 1671. by the pains and industry of Mr. Samuel Foster, late Professor

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of

The Publisher to
of Astronomy in Gresham
College in London, and
Printed in his Miscellanies;
I then designed to Project two
Hemispheres upon the Poles
of the World, conceiving they
would be of far greater use than
those of Dr. Hood's Projected
upon the Poles of the Eclip-
tick. This design of mine, I
communicated to several of my
Mathematical Acquaintance,
who generally approved there-
of; and in confidence of their
Judgements, agreeing with my
own, I Projected two Hemi-
spheres upon the Poles of the
World,

the Reader.

World, which I here present
to thy Friendly Acceptance,
wherein all the Stars (from
either Pole to the Equinocti-
al) are inserted according to
their Right Ascension and
Declination, as I found them
in Mr. Foster's forementioned
Catalogue; and have also ad-
ded such other Constelations
towards the South Pole, as
have been of late discovered,
and are not at all in M^r Hood's
Hemispheres; namely these
12 following, viz.

The Publisher to

	Stars.
<i>Crus</i>	13
<i>Phœnix</i>	15
<i>Indus</i>	12
<i>Pavo</i>	23
<i>Paus. Avis Indica</i>	11
<i>Apis Musca</i>	4
<i>Chamaeleon</i>	10
<i>Triangulum Austr.</i>	5
<i>Pisces Volans Passer</i>	7
<i>Dorado Xiphias</i>	7
<i>Tocan Anser Americanus</i>	8
<i>Hydrus</i>	21

which contains

And to make these my Hemispheres the more Compleat, I have added a moveable Horizon, peculiar to the Latitude of London, the like whereof may be made for any other Place or Latitude.

These Hemispheres being thus

the Reader.

thus far brought to perfection, I acquainted my Loving Friend Mr. William Leybourn therewith, desiring him to write some few Precepts concerning the Use of them, which he promised me to do; and upon the first sight of them, he told me that they might be rendred far more useful then I did expect, and accordingly gave me the Precepts and Directions following, as also the manner of their Projection, and how to furnish them with several other Spherical Circles, as Azimuths, Almicantries, Parallels,

The Publisher to.

lels, &c, whereby these Hemispheres may become as serviceable in the Night season when the Stars may be seen, as a Sun Dial is in the Day time when the Sun shineth. All which Precepts, Rules, and Directions of his (with his assent) I have adventred to Print and Publish; which, together with the Hemispheres themselves, I here offer to thy friendly acceptance, wishing thee as much content and pleasure in the using of them, as I had pains and trouble in their Composure. And now, Reader, as these Hemispheres

mi-

the Reader.

mispheres are the first things
that I have appeared publick in
the World by, so (as I shall
find them to be kindly received,
and accepted) they shall not be
the last of my Endeavours to
promote some other things as
worthy of thy acceptance: In
confidence whereof, and of thy
candid censure of these, I sub-
scribe my self,

Thine, and *Urania's*

Servant,

FRANCIS LAMB.

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THE
DESCRIPTION
AND
CONSTRUCTION
OF THE
HEMISPHERES.

E Ach of the *Hemispheres* consisteth of three Parts, one whereof is *Fixed*, and the other two are *Moveable*.

I. *Of the Fixed Part.*

The *Fixed Circle* is the *Hour Circle*, which is divided into 24 equal Parts or Hours, and numbered from XII. on either side, towards the East and West, by I. II. III, &c. to XII. on the contrary side. And again, each of these Hours is subdivided into 12 equal Parts, each Part containing 5 minutes of Time.

B

With-

Without this Circle of Hours, is another Circle, divided into 32 equal Parts, and Denominated by the names of the 32 Points of the Mariners Compass; discovering the Position of the *Stars* in the Heavens at any time. And of these two Circles do the Fixed Parts of the *Hemispheres* consist.

II. Of the Moveable Parts.

1. Within these Fixed Circles move the two *Hemispheres*, which are limited within two other Circles called *Equinoctials*, which move (with them) upon the Poles of the World, as their Center.

The innermost of which two Circles is divided into 360 equal parts, or degrees, and in a narrow Margine so numbered, from the East, by the South, West, and North, to the East again, by 10. 20. 30, &c. to 360— And this Circle or *Equinoctial* is again subdivided into 12 equal Parts, each Part containing 30 deg. or one Signe of the *Zodiack*, and Named by the Names, and Charactered by the Characters, of the Twelve Signes, thus *ARIES* 10. 20 *Aries* 30, &c.

The outermost of these two Circles is a Circle of *Months*, and is divided into 12 unequal

equal Parts or *Months*, each *Month* having its Proper Name, and its due number of Days, and are thus named and numbered *JANUARY 10. 20. 31, &c.*

Between the Center of the *Hemispheres* (which are the two Poles of the World) and the *Equinoctials*, are inserted the several *Stars* according to their *Right Ascensions*, *Declinations* and *Magnitudes*, the Northern *Stars* upon the Northern, and the Southern upon the Southern *Hemisphere*: All which *Stars* are drawn into such *Constellations* as (by the *Poets*) have been Feigned, or Attributed to them; and such *Stars* as are *In formis*, are there placed, according to there *Right Ascensions Declinations*, and *Magnitudes* also.

From the Center (or Pole) of each *Hemisphere*, to the beginning of the 360 degrees, which is at the beginning (or first deg. of *Aries*, is drawn a Semidiameter, which contains one Quarter of the *Equinoctial Colure* (and therefore I shall so call it) which is divided into 90 un-equal degrees, and is numbered from the beginning of *Aries* upwards towards the Pole, by 10. 20. 30. 40, &c. to 90 at the Pole it self.

Again, from the first degree (or beginning) of *Aries*, to the beginning of *Libra*, in

both *Hemispheres*, there is drawn an oblique Arch of a Circle, which is divided into six unequal Parts or Signes, and each Signe is subdivided into 30 unequal Parts, of which the Northern *Hemisphere* contains the six Northern, and the Southern the six Southern Signes, each Signe being numbered and Charactered thus: *Aries* 10. 20. 30. *Taurus* 10. 20. 30, &c.

This Circle is the Ecliptick, and cutteth the Solstitial Colure in the Points *Cancer* and *Capricorn*, which are 23 degrees 30 minutes distance from the *Equinoctial* on each *Hemisphere*.

There is also upon the Pole, or Center of each *Hemisphere*, two Circles described, the one passing through 23 degrees 30 minutes, and the other through 66 degrees 30 minutes; that which passeth through 23 deg. 30 min. in the { Northern } *Hemisphere* is the { Southern }

Tropick of { *Cancer*, } and that which passeth through 23 degrees 30 minutes of the { *Capricorn*, } { Northern } *Hemisphere* is the { *Artick* } { Southern } { *Antartick* } Circle—None of these Circles have any divisions at all upon them, neither is there any

any need; but by them you may discover what *Stars* are bounded and limited by them.

All these Parts of the *Hemispheres* hitherto described, are general, and are of the same use in all *Latitudes*: But to make the uses of these *Hemispheres* the more ample, there is

2. Another *Moveable Part* added, which is an *Horizon*, which *Horizon* must be peculiar to some certain *Horizon* or part of the World, (and although a General or Universal *Horizon* might easily be contrived, yet the conveniences thereof would not be equivalent to the inconveniencies.) And how to make such an *Horizon* for any assigned *Place* or *Latitude*, and how to divide the same; as also to divide the *Equinoctial Colure* and the *Ecliptick*, shall be shewed at the end of this Tractate. In the mean while take notice, that one of the Semidiameters of this particular *Horizon* (as this is here made for the *Latitude* of *London*, 51 degrees 30 minutes) is divided and numbered in all respects, and with the same divisions as is the *Equinoctial Colure*. But the Arch of the *Horizon* is divided, first into two equal parts,

B 3

and

and each of those numbered by 10. 20. 30, &c. to 90, from the East and West Points thereof, to the North and South, and is again divided into 16 un-equal parts, and named backwards and forwards, from East and West, by the Denominations. of the Points of the Compass—This *Horizon* is to be applyed to, and to move upon the Pole, or the Center, of either *Hemisphere*; and so renders the Uses of the *Hemispheres* general for that *Latitude*,—Note here, that I call the straight part of the *Horizon* the Diameter, and the Circular Part, the Arch of the *Horizon*.

And thus have you an accompt of the severall parts of these *Hemispheres*; it resteth now, that we say something of the Uses of them.

THE



T H E
U S E S
O F T H E
H E M I S P H E R E S .

Probl. 1.

*The day of the Month being given to find the
Suns Place.*

SEEK the day of the Month in the *Move-
able Circle* of Months, and thereto bring
the Diameter of the *Horizon*; so shall it cut
in the *Equinoctial*, the Signe, degree, and
minute, that the *Sun* is then in at Noon, that
day.

Example, Let the day be the 20th. of
April, and let the *Suns* Place be required—
Lay the Diameter of the *Horizon*, upon the
20th. of *April*, and at the same time it will

B 4

cut

cut the 10th degree of *Taurus*, which is the *Suns* Place that day. And so upon the 8 of *August* the *Suns* Place will be found to be in 25 deg. and an half of *Leo*. And the 15th of *November* in 3 deg. 30 min. of *Sagittarius*.

Probl. 2.

The Suns Place in the Zodiack being given, to find the day of the Month.

BRing the Diameter of the *Horizon* to the *Suns* Place, and at the same time it will cut the day of the Month.

So the Diameter (or a Thrid) being laid to the 10th degree of *Taurus*, it will then cut the 20th day of *April*: And laid to 29 deg. and an half of *Leo*, it will cut the 8th day of *August*. And again laid to 3 deg. 30 min. of *Sagittarius*, it will cut upon the 15th of *November*.

Probl. 3.

The Place of the Sun in the Ecliptick being known, to find his Declination.

FInd the degree of the *Suns* Place in the *Ecliptick*, in either of the *Hemispheres*, and bring the divided parts of the Diameter of

of

of the *Horizon* thereto; so shall the degrees of the *Diameter* of the *Horizon*, which are intercepted by the *Suns* Place in the *Ecliptick*, be the degrees of the *Suns* Declination.

So if the *Sun* be in 17 deg. of *Taurus*, the divided part of the *Diameter* of the *Horizon* being brought thereto, there will be cut upon the *Diameter* 17 deg. and that is the *Suns* Declination—Also if the *Sun* be in 10 deg. of *Sagittarius*, the Declination will be found to be 22 deg.—And in the beginning of *Pisces*, it will be found 11 deg. and an half.

And here note, if the *Suns* Place be found in the *Northern Hemisphere*, the *Suns* Declination is North-ward: But if in the *Southern Hemisphere*, the Declination is South also.

Probl. 4.

The Suns Declination being given, to find his Place in the Ecliptick.

IF the *Sun* hath North or South Declination, make use of the North or South *Hemisphere*—Then upon the *Diameter* of the *Horizon* count the degrees of the *Suns* Declination, and turn the *Diameter* about
till

till the deg. of the *Suns* Declination do cross the *Ecliptick*, and where it so crosseth the *Ecliptick*, there is the Place of the *Sun*.

So the *Suns* Declination being 10 deg. North, then 10 deg. of the Diameter of the *Horizon* will cut 25 deg. 55 min. of *Aries*, or 4 deg. 5 min. of *Virgo* in the Northern Hemisphere—And if the *Sun* have 10 deg. of South Declination, it will then cut the *Ecliptick* in 25 deg. 55 min. of *Libra*, or in 4 deg. 5 min. of *Pisces* in the Southern Hemisphere. For the *Sun* makes four Gradations of Declination in a Year, in the several Quarters of the *Ecliptick* contained between *Colure* and *Colure*.

Probl. 5.

The Place of the Sun being known, to find his Right Ascension.

BRing the Diameter of the *Horizon* to the *Suns* Place in the *Ecliptick*, then will the Diameter of the *Horizon* cut also the Circle which is divided into 360 deg. in the degrees of the *Suns* Right Ascension.

So the *Sun* being in 29 deg. of *Taurus*, if you bring the Diameter of the *Horizon* to that deg. counted in the *Ecliptick*, it will cut
the

the Circle which is divided into 360 deg. in 56 deg. 50 min. And such is the *Suns* Right Ascension at that time.—But if the *Suns* Place had been in 29 deg. of *Scorpio*; then his Right Ascension (in the Southern Hemisphere) would be found to be 236 deg. 50 min.

Probl. 6.

The Suns Declination being given, to find his Amplitude.

IN relolving many *Problems*, it will be requisite to have a Thrid Fixed in the Center of the *Hemispheres*; with a small Bead to move upon it, as in this, and some other *Problems* which follow.

First, lay the Diameter of the *Horizon* upon the two Sixes; and set the Bead which is upon the Thrid to the *Suns* Declination, counted upon the Diameter of the *Horizon*: Then move the Thrid along till the Bead do just touch the Arch of the *Horizon*, and what degrees of the Arch the *Horizon* the Bead chanceth to fall upon, those degrees (or that Point of the Compass) counted from the East and West Points of the *Horizon*, are the degrees of the *Suns* Amplitude

or

or Distance of his Rising or Setting, from the true East or West Point.

So the *Sun* having 23 deg. 30 min. of North Declination, set the Bead thereto; and (the Diameter of the *Horizon* lying just upon VI and VI) move the Thred till the Bead upon it do just touch the Arch of the *Horizon*; which it will do at 40 deg. (or within 6 deg. and a Quarter of the North-East or North-West Points of the Compass) which is the *Suns* Amplitude—But if the *Suns* Declination had been 20 deg. the Bead set thereto, and moved to the Arch of the *Horizon*, it would then cut 33 deg. 20 min. (or 25 min. short of the North-East by East, or South-West by South Points of the Compass) for the Amplitude.

Probl. 7.

The Suns Declination given, to find the time of the Suns Rising and Setting.

Rectifie the Bead to the Declination, and lay the *Horizon* to the two Sixes, as before; then move the Thred till the Bead touch the Arch of the *Horizon*; and then shall the Thred shew upon the Hour Circle, the Hour and minute of the *Suns* Rising or Setting. So

So the Declination being 23 deg. 30 min. the Bead rectified and brought to the Arch of the *Horizon*, the Thred will then cut the Hour Circle at 47 min. after III in the Morning, at which time the *Sun* Riseth; and if you carry the String yet on, till the Bead touch the Arch of the *Horizon* in the other side of XII. the Thred will then fall upon 13 min. after VIII. at Night; at which time the *Sun* Setteth—But if the *Sun* have 20 deg. of North Declination, you shall find that he will Rise 11 min. after IV. and Set at 49 min. after VII.

Probl. 8.

How to find the Right Ascension of any Star.

MOve the Diameter of the *Horizon* about, till it lie upon the Center of the *Star*; and upon the Circle of 360 deg. the Diameter of the *Horizon* shall there shew the degrees of Right Ascension.

So the Diameter being laid upon *Côr Leonis*; shall cut 147 deg. 17 min.—And laid upon the *Bulls-Eye*, it shall cut 64 deg. 17 min. which are the Right Ascensions of those *Stars*.

Probl.

Probl. 9.

To find the Declination of a Star.

MOve the Graduated Part of the Diameter of the *Horizon* about, till it cut the *Star* desired, and count what degrees of the Diameter are cut by the *Star*, for those are the degrees of the *Stars* Declination.

So if the Diameter of the *Horizon* be brought about till it touch *Cor Leonis*, that *Star* shall be cut by 13 deg. 33 min. which is that *Stars* Declination—And the Diameter being turned about to the *Bulls-Eye*, that *Star* shall be cut by 15 deg. 46 min. and that is his Declination.

Probl. 10.

To find what Stars do never Set, but are always above the Horizon in any Latitude.

COUNT your *Latitude* upon the Graduated Diameter of the *Horizon*, from the Pole or Center downwards, (calling 80 deg. 10 deg. and 70 deg. 20 deg. &c.) So keeping your Finger, or setting a Pin, in that Point; turn the *Horizon* round about, and
all

all those *Stars* which are between your Finger and the Pole, do never Rise nor Set, but are always above that *Horizon*—For all such *Stars* whose Declination are greater then the Complement of any *Latitude*, do never Rise or Set in that *Latitude*—And all such *Stars* in the contrary *Hemisphere*, whose Declination do exceed the *Latitude*, those *Stars* do never Rise, or appear in that *Latitude*.

And thus, if you lay the Diameter to *Lucida Lyra*, you shall find that *Star* to lie just under 51 deg. 30 min. (if you count the degrees from the Pole downwards) so that in the *Latitude* of 51 deg. 30 min. when that *Star* is to the West-ward of the South part of the Meridian, it continually Descends Lower and Lower, till being Arrived to the North part of the Meridian, and then it immediately begins to Ascend, till it Arrives to the Southern part of the Meridian again.

Probl. 11.

To find the Longitude of any *Star*, or any *Stars* Place in the *Ecliptick*.

Lay a String, or Ruler, from the Pole of the *Ecliptick*, (which is marked in each
He-

Hemisphere by the Character \odot , and is at the Intersections of the *Solstitial Colures*, with the *Artick* and *Antartick* Circles) to the Center of the *Star* whose *Longitude* is required; and so shall the String or Ruler cut in the *Ecliptick Line*, and also in the *Equinoctial*, the Signe and degree of the *Stars Longitude*.

So a Ruler laid from \odot (the Pole of the *Ecliptick*) to *Aldebaron*, or the *Bulls-Eye*, it will cut both the *Equinoctial* and *Ecliptick* Circles in 5 deg. 31 min. of *Gemini*, or in 65 deg. 12 min. of the Circle of 360 deg. — And laid from the Pole of the *Ecliptick* \odot , to the *Lions Tail*, it shall cut the *Ecliptick* and *Equinoctial*, both of them in 19 deg. of *Virgo*, or in 169 deg. of the Circle of 360 deg.

Probl. 12.

To know what Stars shall be upon the Meridian at any Hour of the Night throughout the Year.

Lay the Diameter of the *Horizon* upon XII. and XII. and move the *Hemisphere* about, till you bring the Day of the Month just against the proposed Hour, so shall all those *Stars* which lie under the Diameter of the *Horizon*, be upon the Meridian at that Hour of the Night. Thus,

Thus, if it were required to know what *Stars* shall be upon the Meridian upon the 14th. of *January*, at 8 of the Clock.

Lay the Diameter of the *Horizon* upon XII. and XII. then turn the *Hemisphere* about, till you bring the 14th. day of *January* to lie just against VIII. in the Hour Circle; then will all those *Stars* which lie just under the Diameter of the *Horizon*, be upon the Meridian at VIII. of the Clock that Night, of which you shall find *Aldebaron*, or the *Bulls-Eye* to be the Principal.—And at 4 minutes after XI. that Night will the *Little Dog* be upon the Meridian.

Probl. 13.

To know what *Stars* will be upon the Meridian at Midnight, any Night in the Year.

Lay the Diameter of the *Horizon* upon the Day of the Month, so shall all the *Stars* which lie under the Diameter be upon the Meridian at XII. of the Clock.—This needeth no Example, but you may find,

that upon	{	Feb. 6.	} the	{	Lions Heart
		Feb. 16.			Lions Back
		March 3.			Lions Tail
		March 27.			Virgins Spike

will be upon the Meridian at XII. at Night,
 &c. C Probl. 14.

Probl. 14.

To know at what Hour of the Night any Star will be upon the Meridian.

Lay the Diameter of the *Horizon* upon XII. and move the *Hemisphere* about, till the *Bulls-Eye* lies just under the Diameter, then just against the first day of *January* in the Circle of Months you shall find 55 minutes past VIII in the Hour Circle, which shews that at that time the *Bulls-Eye* will be upon the Meridian.

Probl. 15.

To find the difference of Longitude, or the Horary Distance of any two Stars.

BRing one of the *Stars* against XII. in the Hour Circle, then lay the Diameter of the *Horizon* upon the other *Star*; and what Hour that cuts (counted from XII.) upon the Hour Circle, is the Distance of *Longitude*, or *Horary Distance* of these two *Stars*.

Thus, Let the two *Stars* be the *Bulls-Eye*, and the *Lions Tail*.

Bring

Bring the *Lions Tail* to XII. and then if you lay the Diameter of the *Horizon* upon the *Bulls-Eye*, you shall find it to cut 7 Hours and 15 minutes, which is 109 degrees, and such is the difference of *Longitude* of these two *Stars*, or their *Horary Distance*.

Probl. 16-

To find the Hour of the Night by the Stars.

SEE what *Star* you find to be either upon the North, or South part of the Meridian; and accordingly bring the same *Star* to the like Meridian in the *Hemisphere*: then look the day of the Month in the Circle of Months, right against which you have the true Hour of the Night.

Thus, if upon the 20th. of *January* you should find *Aldebaron*, or the *Bulls-Eye* to be upon the South part of Meridian; bring *Aldebaron* just against XII. in the *Hemisphere*, then against the 20th. of *January* you shall find 22 minutes before 8. or 38 minutes after 7. which is the true Hour of the Night on the 20th. of *January*, when *Aldebaron* will be upon the Meridian.

Probl. 17.

To find the Semidiurnal, or Seminocturnal Arch of any Star.

Lay the Diameter of the *Horizon* upon VI. and bring the *Star* justly to touch the Arch of the *Horizon*: Then lay the Diameter of the *Horizon* upon the *Star*, and count how many Hours are contained between either of the XII's. for the one is the Semidiurnal, and the other the Seminocturnal Arch of that *Star*.

Thus, if you lay the Diameter of the *Horizon* upon VI. and bring *Aldebaron* to touch the Arch of the *Horizon*; and then lay the Diameter of the *Horizon* upon *Aldebaron*, you shall find it to cut upon 36 minutes after III. if you count the Hours from XII. so that the Seminocturnal Arch of that *Star* is 4 Hours 36 minutes: And if you count the Hours from the other XII. you shall find them to be 7 Hours and 24 minutes, which is the Semidiurnal Arch of that *Star*, it being a *Star* having North Declination.

Probl. 18.

Probl. 18.

To find the Amplitude, or the Point of the Compass upon which any Star Riseth or Setteth.

Lay the Diameter of the *Horizon* upon VI. and bring the *Star* to touch the Arch of the *Horizon*, so shall the degrees of the Arch of the *Horizon* contained between the East or West Points of the *Horizon*, shew the Amplitude of that *Stars* Rising and Setting, from the East or West, towards the North or South.

Thus, If you lay the Diameter of the *Horizon* upon VI. and bring the *Bulls-Eye* to the Arch thereof, you shall find it to lie under 26 degrees of the *Horizon*; and so many degrees doth that *Star* Rise distance from the true East Point towards the North, and Sets so many degrees distance from the West North-ward also, (because the *Star* hath North Declination) and so his Amplitude of Rising is North-East by East 8 degrees Easterly. And his Amplitude of Setting is North-West by West 8 degrees Westerly.

Probl. 19.

To find at what Hour any Star Riset or Setteth.

Lay the Diameter of the *Horizon* upon VI. and bring the *Star* to lie just under the Arch of the *Horizon* on the East side. Then seek the day of the Month in the Circle of Months, and the Hour which standeth against it, is the Hour of the *Stars* Rising: And if you bring the *Star* to lie under the Arch of the *Horizon* on the West side against the day of the Month, you shall have the time of the *Stars* Setting.

Thus, upon the 25th of December, if you would know at what Hour the *Bulls-Eye* Riset and Sets. Lay the Diameter of the *Horizon* upon VI. and bring the *Bulls-Eye* just under the Arch of the *Horizon* on the East side, and against the day of the Month you shall find II Hours from the Meridian, which is 2 of the Clock in the Afternoon for the time of that *Stars* Rising. And the *Star* being brought under the West part of the *Horizon*, the day of the Month shall be against IIII Hours 46 minutes, which is 46 minutes after 4 in the Morning, at which
Hour

Hour *Aldebaron*, or the *Bulls-Eye* Setteth.

Probl. 20.

To know what time of the Year any Star in the Hemisphere will be upon the Meridian at 12 a Clock at Night.

BRing the *Star* to XII on the South part of the Meridian, then upon that day of the Month which standeth against the North XII, shall that *Star* be upon the Meridian at Midnight.

Example.

I would know upon what Night in the Year the *Bulls-Eye* will be upon the Meridian at 12 at Night : Bring the *Bulls-Eye* against the South XII, and against the North XII you shall find the 16th. of *November*, upon which Night at 12 of the Clock *Aldebaron* (or the *Bulls-Eye*) will be upon the Meridian.



AN
APPENDIX
CONTAINING THE
CONSTRUCTION
OF THESE
HEMISPHERES:

AND

How to Project other Spherical Circles upon them, whereby they may yet be rendred more useful.

IN the beginning of this *Treatise*, I promised to shew how to make an *Horizon* for any *Latitude* assigned (as that adjoynd to one of these *Hemispheres* is made for the *Latitude* of *London*) and therefore I think it convenient, before I shew how to Project the *Hemispheres* in general, and to describe other Circles upon them; to make good what

what I promised there first: And therefore I shall here shew,

How to make an Horizon futable to the Hemispheres, for any assigned Latitude; rendring the Hemispheres Universal.

THE *Horizons* in all parts of the World do intersect both the *Equinoctial* and *Prime Vertical Circle* in the East and West Points; and the *Zenith*, (which is also the Pole of the *Horizon*) is always so far removed from the Poles of the World (which are the Centers of these *Hemispheres*) so much as the *Latitude* wanteth of 90 degrees: for there is always 90 degrees distance between the *Zenith* and *Horizon*; and therefore to make an *Horizon* for any Place, the first thing to be done is,

1. To find the *Zenith Point* upon the *Meridian*: And
2. The *Point* upon the *Meridian*, through which the *Horizon* must pass.

BOth which Points may be found, and also the *Horizon* it self divided, from the *Hemispheres* themselves. And now let it be required,

To

To make an Horizon for the Latitude of 40 degrees.

With a Pair of Compasses out of one of the *Hemispheres* (the Northern for Example) take from the Center to 40 degrees of the divided Semidiameter, and set that distance upon another Semidiameter, which distance will reach from the Center to the letter Z, which is the *Zenith* Point for the *Latitude* of 40 degrees, and falleth near to the *Star Lyra*—Again, because 40 degrees wants 50 degrees of 90 degrees, therefore take 50 degrees out of the divided Semidiameter, and set that distance from the Center to H, through which Point H, which is near unto *Auriga*, must the *Horizon* for 40 degrees be known; and must also intersect the *Equinoctial* in the East and West Points, namely in γ and α , and the Line γ H α drawn upon the Northern *Hemisphere* is the Arch of the *Horizon* of 40 degrees.

The Arch of the *Horizon* being described, it may thus be divided.

Lay a Ruler to the Point Z, and to every degree of the Circle of 360 degrees, and where

where the Ruler cuts the Arch of the *Horizon*, there must the divisions be marked and known, as you see is done for the *Horizon* of *London* adjoyned to one of the *Hemispheres*.

And in this manner may an *Horizon* be drawn and divided for any *Latitude*.— And again,——If a Semicircle of the same *Radius* with the *Hemispheres* were drawn, divided, and cut out, as the *Rete* of the *Mathematical Jewel* is, and placed on the Center of the *Hemispheres*, it would be an *Universal Horizon*.

Concerning the Projecting of the Hemispheres.

FOR the Projecting of these *Hemispheres*, it is necessary to have a Scale of *Chords*, half *Tangents*, *Tangents*, and *Secants*, all of them to the same *Radius* as you intend your Projection to be.

Wherefore having recourse to the Scheme at the end of this *Appendix*,

1. Let the *Primitive Circle* noted with \vee A = B, represent the *Equinoctial*, or Hour Circle of the *Hemispheres*, divided into 24 equal parts, and marked with their proper Hours

Hours: The Center whereof marked with \odot represents the Pole of the World.

2. The Diameter $A \odot B$, having 12 at each end thereof, is the general Meridian, and the *Solstitial Colure*.

3. The Diameter $\gamma \odot \simeq$ having 6 at each end thereof, and drawn at Right Angles to the former, is the Hour Circle of 6 a Clock, and also the *Equinoctial Colure*.

4. The Circle O, P, F, S , is a *Polar Circle*, and is distance from \odot the Pole of the World, 23 degrees 30 minutes, equal to the obliquity of the *Ecliptick*, which Circle is thus to be described—Take 23 degrees 30 minutes out of your Scale of half *Tangents*, and with that distance upon the Pole \odot , describe the Circle O, P, F, S , which shall be the *Polar Circle*.

5. The Circle $E \oslash W \wp$, representeth either of the *Tropicks*, and is distant from the *Equinoctial* $A \gamma B \simeq$, 23 degrees 30 minutes, equal to the obliquity of the *Ecliptick*; or it is 66 degrees 30 minutes distance from \odot (its Pole and) the Pole of the World—To Project it, out of your Scale of half *Tangents*, take 66 degrees 30 minutes, and with that distance on the Pole, or Center \odot , describe the Circle $E \oslash W \wp$, representing either *Tropick*.
And

And here note, that all Circles described upon the Pole \odot , are all Circles or Parallels of the *Suns* or *Stars* Declinations, and may be inserted by help of the Scale of half *Tangents*, as the *Polar* and *Tropical* Circles were.

6. The Circle $\gamma \text{ } \text{E} \text{ } \text{A}$ is the *Ecliptick*, whose greatest obliquity from the *Equinoctial* is 23 degrees 30 minutes, and so falls just in the Point E —It is thus to be described: The half *Tangent* of 66 degrees 30 minutes will reach from \odot to E —For its Center, its greatest obliquity from the *Equinoctial*, being 23 degrees 30 minutes, take out of your Scale of *Secants*, the *Secant* of 23 degrees 30 minutes, and that distance shall reach from E upon the Meridian to G, which Point G is the Center upon which the *Ecliptick* $\gamma \text{ } \text{E} \text{ } \text{A}$ must be described—For its Pole, it is the Point P, the Intersection of the *Polar* Circle with the Meridian, through which Point all the Circles of the *Stars Longitude* are to pass.

7. The Circle $\gamma \text{ } \text{H} \text{ } \text{A}$, represents the *Horizon* of *London*, whose *Latitude* is 51 degrees 30 minutes.—To describe which, take the
half

half *Tangent* of 51 degrees 30 minutes, and that shall reach from \odot to H, the Intersection of the Meridian and *Horizon*—For its Center, out of the Scale of *Tangents* take the *Tangent* of 51 degrees 30 minutes, and that shall reach from H to I, which Point I is the Center of the *Horizon*, upon which it must be described—For its Pole, the half *Tangent* of 38 degrees 30 minutes (its Complement) being set from \odot to Z giveth the Point Z for the *Zenith* of the place, which is also the Pole of the *Horizon*, through which Point must all the *Azimuth* Circles pass.

These forementioned, are all the Circles which are described upon the *Hemispheres*. It remains now to shew how to inscribe other *Spherical* Circles upon them, which will render them far more useful then before.

8. The Circle K, P, L, is a Circle of *Longitude* passing through 65 degrees 12 minutes, which is the *Longitude* of *Aldebaron* or the *Bulls-Eye*—To describe this, or the like Circle—First, they must all pass through the Point P, and through every degree of the
the

the *Ecliptick*; so that the *Ecliptick* being divided from the Point P, the Pole thereof, as I shewed how to divide the *Horizon* from Z, the Pole thereof, you have three Points given, through which they may be described (or by the side of a Steel Bow) for the Centers of them will all fall in one right Line, which must be drawn at right Angles to the Meridian, it being extended so long that the *Tangent* of 66 degrees 30 minutes will reach from S upon it, and where that extent endeth, will be the Center of the 00 deg. and 180 deg. of *Longitude*, viz. the Circle γ P \simeq : the Centers of the rest will be in the same right Line drawn at right Angles to the Meridian, through the former Center, and may be found by their natural *Tangents*.

9. The Center * a *, is a Parallel of the *Bulls-Eyes* Declination, 15 degrees 48 minutes, and is found by taking the half *Tangent* of 74 degrees 12 minutes its Complement, and with that distance describe the Circle * a * upon the Center o.

10. The Circle γ Z \simeq is the *Prime Vertical* Circle, or *Azimuth* of East or West.—To describe it, it is to pass through Z the *Zenith*, as all *Azimuths* must do, and seeing the *Zenith* is 38 degrees 30 minutes distance from

from the Pole, the *Secant*, Complement thereof, viz. the *Secant* of 51 degrees 30 minutes, taken from the Scale of *Secants*, and set from Z upon the Meridian (extended) shall give the Point Y for the Center of the said *Prime Virtual Circle*—And in a Line drawn at right Angles to that Meridian, through this Point Y, as the Line Y D, shall the Centers of all *Azimuth Circles* fall—And to find them, you must make Z Y a *Radius*, and the natural *Tangents* of 10. 20. 30, &c. Set from Y upon that Line both ways, shall be the Centers for the *Azimuths* of 10. 20. 30, &c. degrees from the East or West, as the Point D is the Center of the *Azimuth* R * Z V, an *Azimuth* of 39 degrees 42 minutes from the East, or of 50 degrees 18 minutes from the South, and the Point d on the other side is the Center of the *Azimuth* M * Z, passing through the *Bulls-Eye* at 6 a Clock, being 80 degrees from the Meridian, or 10 from the East.

11. The Circle *m e * n*, is a Circle of *Altitude* of 20 degrees 20 minutes, passing through the *Bulls-Eye* when he is upon the West *Azimuth*—To describe this, or any other Parallel of *Altitude*—Lay a Ruler from *γ* to H, and it will cut the *Equinoctial Circle*

Circle in π . — Then out of your Line or Scale of *Chords* take 20 degrees 20 minutes, and set it from π to ω ; then a Ruler laid from ν to ω , shall cut the Meridian in the Point e , through which the Parallel must pass — Again, lay a Ruler to ν , and the opposite Intersection of the *Meridian* and *Horizon*, so shall the Ruler cut the *Equinoctial* in δ : then from δ to θ set 20 degrees 20 minutes, and a Ruler laid from ν to θ shall cut the Meridian extended in ρ : divide the Space between e and ρ into two equal parts, in f , so shall f be the Center of the Parallel of *Altitude* of 20 degrees 20 minutes $m e * n$. And the like is to be done for any other.

And thus have I briefly shew'd how to Project several Circles of the Sphere upon these *Hemispheres*, which will render them far more useful, as by some *Problems* following will appear.

D

A



SYNOPSIS
Of the preceding
PRECEPTS
OF THE
PROJECTING
OF THE
HEMISPHERES:

\vee A \cong B the *Equinoctial Circle*.

E \wp W \cong the two *Tropticks*.

\odot S or \odot \wp each of them equal to the half
Tangent of 66 deg. 30 min.

\odot S or \odot P each of them equal to the half
Tangent of 23 deg. 30 min. \cong G

Each of them equal to the *Secant* of
23 deg. 30 min.

G being the Center of the *Ecliptick*.

H equal to the half *Tangent* of *Latitude*
51 deg. 30 min.

HI equal to the *Tangent* of 51 deg. 30 m.

I the Center of the *Horizon*.

○ Z equal to the *Tangent* of 38 d. 30 m.

○ Center of the *Tropticks*.

○ Center of the two *Polar Circles*.

P O S F the *Polar Circles*.

∩ ∅ ≡ the *Equinoctial Colure*.

A ∅ B the *Solstitial Colure*.

∩ ∅ ≡ the *Ecliptick*.

∩ H ≡ the *Horizon*.

Z the *Zenith*.

P the Pole of the *Ecliptick*.

K P L a Circle of *Longitude* passing
through the *Bulls-Eye*.

○ the Pole of the *World*.

M * Z, or Z * N an *Azimuth* passing
through the *Bulls-Eye* at 6 a Clock.

∩ Z ≡ the *Prime Vertical Circle*, or *Azi-*
muth of East and West.

* a * a Parallel of the *Bulls-Eyes* Decli-
nation 15 deg. 48 min.

m e * n a Parallel of *Altitude* passing
through the *Bulls-Eye* when he is upon the

East or West *Azimuth*, viz. 20 deg. 20 min.

f the Center of the Parallel of *Altitude*
m e n 20 deg. 20 min.

R * Z V an *Azimuth* of 50 deg. 18. min.
from South.

* r v a Parallel of *Altitude* of 45 deg.

v P = the Circle of *Longitude* belong-
ing to 00 deg. and 180 deg.

Probl. 1.

To find the Pole of any Great Circle.

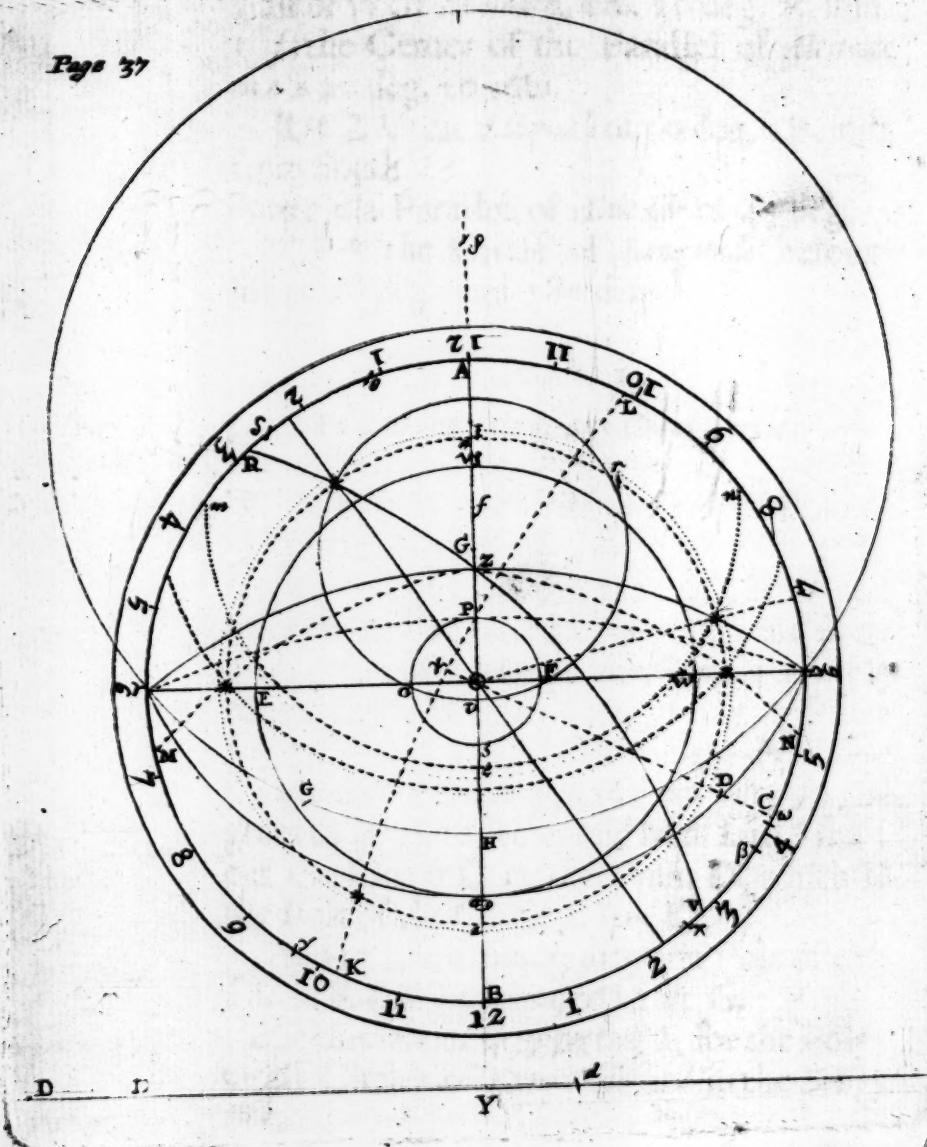
LET it be required to find the Pole of
the Circle of *Longitude* K * P L.
Take 90 degrees of the Line of *Chords*, and
set it from K or L to the Point C, and draw
a Line from C through the Center o, till it
touch the Circle in \downarrow ; then lay a Ruler
from L to \downarrow , and it will cut the *Primitive*
Circle in the Point γ , and from γ set 90 de-
grees to β , and a Ruler laid from L to β shall
cut the Line o C in the Point D, which is
the Pole of the Circle L P * K.

And in like manner may the Pole of the
Circle R Z V be found to be at G.

But this labour may be sav'd; for the Poles
of all Circles of *Longitude* are in the *Eclip-*
sick.

The





The Poles of all *Azimuths* in the *Horizon*.

The Poles of all Hour Circles, in the *Equinoctial*, &c. But I intended not here a *Treatise of Projection*.

Probl. 2.

To find the Latitude of a Star.

THE *Latitude* of a *Star*, is its distance from the *Ecliptick*: wherefore through the *Star* draw a Circle of *Longitude*, as the Circle K P L is a Circle of *Longitude* passing through *Aldebaran* or the *Bulls-Eye*, the Pole whereof is at D; then lay a Ruler from D the Pole of the Circle, to the *Star*, and note where it cuts the *Primitive Circle*; also lay the Ruler from D, to the Intersection of the Circle of *Longitude* with the *Ecliptick*, and note also where the Ruler cuts the *Primitive Circle*: the distance between these two marks, measured upon the Line of *Chords*, is the *Latitude* of that *Star*, and for *Aldebaran* will be found to be 5 degrees 31 minutes.

Probl. 3.

To know at what Horary distance from the next Meridian, any Star will be upon the East or West Azimuth.

First draw a Parallel of the Stars Declination; then draw an *Azimuth* Circle of East and West, and note where they intersect; then from the Center, to the Point of their Intersection, lay a Ruler, or extend a Thred, which will fall upon the Stars *Horary* distance from the Meridian.

So the Parallel of the *Bulls-Eyes* Declination, being the Circle * a *, intersecting the *Prime Vertical* Circle, or *Azimuth* of East or West v Z (on the West side thereof) in the Point *, the Line o * being drawn through that Point of Intersection, will cut the Hour Circle in 5 Hours and 8 minutes from the next Meridian: and at such distance will the *Bulls-Eye* bc, when he is upon East or West *Azimuth*.

Probl. 4.

To find what Altitude any Star shall have when he is due East or West.

From the Intersection of the Meridian and *Horizon* lay a Ruler to the Point where the Parallel of the *Stars* Declination cuts the *Azimuth* Circle of East or West, and mark where it cuts the *Primitive* Circle; the distance of that Point from γ or α being measured upon the Line of *Chords*, shall there shew the *Altitude* of the *Star*.

So the *Bulls-Eye* being upon the East or West *Azimuth*, will be found to have 20 degrees 20 minutes of *Altitude*.

Probl. 5.

To know what Altitude any Star shall have when he is six Hours distance from the Meridian.

Draw a Parallel of the *Stars* Declination, and note where it cuts the Hour Line of Six, and through that point of Intersection describe an *Azimuth* Circle, and find the Pole thereof, from which Pole, lay a Ruler to the *Star*, and note where it cuts the

Primitive Circle, also lay a Ruler from the *Azimuth Pole*, to the Point where the *Azimuth* which passeth through the *Star* cuts the *Horizon*, and mark where it cuts the *Primitive Circle*; the distance between this and the former mark, being measured upon the *Line of Chords*, shall shew the *Altitude* of the *Star*.

And by thus doing, the *Altitude* of *Aldebaran* at 6 Hours distance from the *Meridian*, will be found to be 12 degrees 20 minutes.

Probl. 6.

To know what *Azimuth* any *Star* shall have, when he is six Hours distance from the *Meridian*.

Through the Point of Intersection of the *Stars Parallel* of *Declination* with the Hour of six, draw an *Azimuth Circle* as before; then from Z the *Zenith*, to the Intersection of the *Azimuth* passing through the *Star*, and the *Horizon*, lay a Ruler, and mark where it cuts the *Primitive Circle*; the distance from the *Meridian* to this Point shall give the *Stars Azimuth* from the *South*.

And

And thus the *Bulls-Eye*, when he is six Hours distance from the Meridian, will be found to have 80 degrees of *Azimuth* from the South.

Probl. 7.

The Declination and Altitude of a Star being given, to find the Stars Hour.

First describe a Parallel of the Stars *Declination*, and another of the Stars *Altitude*, and through their Point of Intersection draw a right Line from \odot the Center of the Projection, which Line shall shew the Stars *Horary distance* from the Meridian.

Thus the *Declination* of the *Bulls-Eye* being 15 degrees 48 minutes, whose Parallel is $\ast a \ast$, and the *Altitude* of the *Bulls-Eye* observed to be 45 degrees, which is the Parallel of *Altitude* $\ast v r$, Intersecting each other in the two Points \ast and r : If you lay a Ruler from \odot the Pole or Center, to \ast or r , it will in either case cut the *Primitive*, or *Equinoctial Circle* in 2 Hours and 17 minutes from the Meridian, which is the Stars *Hour*, or his *Horary distance* from the Meridian.

Probl. 8.

Probl. 8.

The Declination and Altitude of a Star being given, to find the Azimuth that that Star is upon.

First you must describe the *Stars Parallel* of *Altitude*, and *Parallel* of *Declination*, as in the last *Problem*, and through their *Point of Intersection*, and the *Zenith Point Z*, describe an *Azimuth*, and to find what *Azimuth* that is, I do thus;
 Look where the *Azimuth Circle* cuts the *Horizon*, and lay a *Ruler* from the *Zenith Z*, to this *Point of Intersection*, and mark where the *Ruler* cuts the *Primitive Circle*; the distance between the *Meridian*, and the place where the *Ruler* cut the *Primitive Circle*, measured on the *Scale of Chords*, will be the *Azimuth* which the *Star* was then upon.
 And thus the *Bulls-Eye* having 45 degrees of *Altitude*, his *Azimuth* from the South part of the *Meridian* will be found to be 50 degrees 18 minutes.



A POSTSCRIPT, SHEWING

*Several ways whereby to find the Stars Hour
readily, and consequently the true Hour of the
Night by the Hemispheres.*

THere are several ways by which the
Stars Hour distance from the Meri-
dian (call'd the *Stars Hour*) may be obtain-
ed: As,

I. *By any Quadrant, or other Instrumental
Dial, which giveth the Hour of the Day by
the Sun.*

I will illustrate this in the use of Mr. Gun-
ters *Quadrant*, it being an Instrument
more frequently known then any other of
that kind: For,

If you observe the same Rules in finding
the

the *Stars* Hour, as is directed for finding of the Hour of the Day by the *Sun*; that is, by setting the Bead to the *Stars Declination*, instead of the *Suns Declination*, and then observe the *Stars Altitude* as if it were the *Suns Altitude*, the Bead shall then shew among the Hour Lines the *Stars* Hour, or the *Stars Horary* distance from the Meridian.

But here you are to note, that this way of finding the *Stars* Hour is peculiar to such *Stars* only as are between the *Tropicks*. Wherefore, another more general way may be this:

II. By a Sun Dial made under the Soyl, and on the Jaums of a Jetty Window, on the inside of a Room.

And such a Dial may be thus made.

HAVING made a small round hole in any Quarry of Glass in the Window, and darkned the other part of the same Quarry round about the hole, you must upon the Window Board draw a Meridian Line, wick Line must pass directly under the hole before made, and must be transferred to the Cieling of the same Room,

Room, by the help of Perpendicular Threds.

Then from the hole in the Window, to the Meridian Line on the Cieling, extend a String, till it make an Angle equal to the *Latitude* of the place you make the *Dial* in, and where the String (with this condition) so resteth, fix the end of the String in that point of the Cieling, leting the other part of the String hang at liberty.

This done, by help of an *Horizontal Dial*, whose Center (for the present) must be placed in the hole in the Window; the Lines of which *Dial* must also be extended by a Thred fixed in the Center thereof, by which Line extended over each Hour, and the String before fixed in the Cieling, the Hour Lines may be transferred and marked upon, or under the Window Board; and also upon the *Faums* and *Cheek Posts* of the said Window, and there numbred by Letters or Figures.

Now such a *Dial* being made I shall shew,

How

*How to find the Hour by the Sun in the day time,
and any Stars Hour (or Horary distance
from the Meridian) in the Night Season.*

1. By the Sun.

THE *Sun* shining through the hole before made in the Window, move the String, whose end is fixed in the Cieling, along the Hour Points which are marked about the Window, untill such time that the Spot of light that cometh through the hole shineth upon the String, and then see upon what Hour, or part of an Hour the String resteth, for that is the true time of the Day.

2. By the Stars.

This differeth little from the former; for when through the Window you see a *Star* you know, and would know his Hour, move the String along the Hour Points as before, till such time as you bring your Eye, the String, the Hole, and the *Star* all in one and the same Plain or right Line; for then will the String rest upon that *Stars* Hour,

Hour, or his *Horary* distance from the Meridian.

III. *By a Dial made in a Yard or Garden.*

IN some convenient open place erect a Pole perpendicular to the *Horizon*, about 10 or 12 foot high; then provide a Frame of Wood in form of a *Parallelogram*, of what bigness you please, (but the sides being 2 foot broad, and 3 foot long, is a competent bigness) within the *Area* of this Frame make the true Hour Lines of an East and West *Dial*; which Hour Lines may be of reasonable big Wyre; and upon the edges of the Frame, set the numbers of the Hours, the Forenoon Hours on the East side, and the Afternoon Hours on the West side, and over the Hour Line of six erect an *Axis* (of a competent length) as if it were a *Sun Dial*: Which *Dial* being thus prepared, if you set it upon the former erected Pole, so that the two ends of the Frame may stand due North and South, and the *Stile* thereof Parallel to the *Axis* of the World, then is it fit for use, either to find the Hour of the Day by the *Sun*, or the *Stars* Hour in the Night.

I. By

1. *By the Sun.*

THis is all one as if it were a *Dial* made against a Wall, for the shadow of the *Axis* upon the Frame will shew the Hour of the Day.

2. *By the Stars.*

WHen you see a *Star* you know, and would find that *Stars* Hour; move your self about the *Dial* Post (coming near to it, or going farther from it) as occasion offereth, till you bring your Eye, the *Axis*, and the *Star* in the same Plain or right Line, and then mind what Hour Line (or between what Hour Lines) is intercepted by that view, for that is that *Stars* Hour; and by this *Dial* you may at any time know,

What Stars are upon the Meridian.

IF you go behind the North end of the Frame, and look by the side of the Frame, you shall see what *Stars* are then upon the South part of the Meridian.

And if you go behind the South end of the

the Frame; and look by the side of the Frame you shall there see what *Stars* are upon the North part of the Meridian.

And thus, the *Stars* Hour (by any of the forementioned ways, or any other way) being obtained,

To find the true Hour of the Night.

WHEN you have found any *Stars* Hour, seek that *Star* in its proper *Hemisphere*, and bring it to the same Hour that you found it to be upon; then against the day of the Month you shall have the true Hour of the Night.

1. *Example*: Suppose that upon the 31 of *December* I find the *Great Dogs* Horary Distance from the Meridian (or his Hour) to be 9 Hours and 22 minutes, I turn the *Hemisphere* about till the *Great Dog* lie just againd 9 Hours 22 minutes in the Hour Circle; then against the 31 of *December*, I find 8 Hours and 22 minutes, which is the true Hour of the Night.

2. *Example*, Upon the 11th. of *December* I observed the Horary Distance of the *Bulls-Eye* to be 8 Hours and 56 minutes from the

E

Me-

Meridian; wherefore I bring the *Bulls-Eye* to lie just against 8 Hours & 6 minutes in the Hour Circle; and then against the 11th. of *December* I find the true Hour of the Night to be 13 minutes after 7.

3 *Example*. I observed the Hour of *Arcturus* upon the 6th. of *February* to be 24 minutes after 6; and bringing *Arcturus* to that Hour, against the 6th. of *February* I find 10 Hours and 23 minutes, which is the true Hour of the Night.

Many more *Examples* might be added, but I deem these sufficient, the thing it self being so obvious; and not only these, but divers other *Problems* might be performed by these *Hemispheres*, by other means then such as I have prescribed in this *Treatise*; namely (by help of a Pair of *Compasses*) without having the innermost Circle to move within the Hour Circle; and also by having the *Right Ascension* of the *Sun* and any *Star*, both which may be found by the *Hemispheres* the forementioned *Problems* (many of them) may be found *Arithmetically*, as I have shewed in my *Panorganon* lately Published; a hint thereof I will give in this place.

For, If you add the *Right Ascension* of any
Star,

Star, the Complement of the *Suns Right Ascension*, and the *Stars Hour*, all three together (deducting 12 Hours if the *Sun* be greater) and that Sum shall be the true Hour of the Night.

For Trial; Let us take the first *Example* before going, where upon the 31 of *December* the *Great Dogs Hour* was 9 Hours 22 minutes from the Meridian.—The Complement of the *Suns Right Ascension* was 4 Hours 30 minutes—And the *Right Ascension* of the *Great Dog* was 6 Hours 30 minutes; these three numbers being added together, and 12 Hours abated (because the *Sun* was 20 hours 22 minutes) there will 8 Hours and 22 minutes remain, for the Hour of the Night, thus:

	Ho.	min.
<i>Great Dogs Hour</i>	9	22
<i>Com. of the Suns R. Ascen.</i>	4	30
<i>Great Dogs R. Ascension</i>	6	30
<hr/>		
Their Sum	20	22
Deduct	12	00
<hr/>		
There remains	8	22

Which 8 Hours 22 min. is the true Hour of the Night.

And

And by this means may divers other Problems be resolved. For, Six Hours being added to the *Ascensional* difference of any *Star*, shall give you the *Semi-diurnal* Arch of that *Star*; and doubled, the *Diurnal* Arch, and subtracted from 24 Hours, the *Nocturnal* Arch. Thus,

	Ho.	min.
The <i>Ascensional</i> difference of the <i>Bulls-Eye</i> is	1	23
Add 6 Hours	6	00
	<hr/>	
The Sum	7	23
The double whereof is	14	46

Which is that *Stars Diurnal* Arch, or the time which the *Star* continues above the *Horizon*.

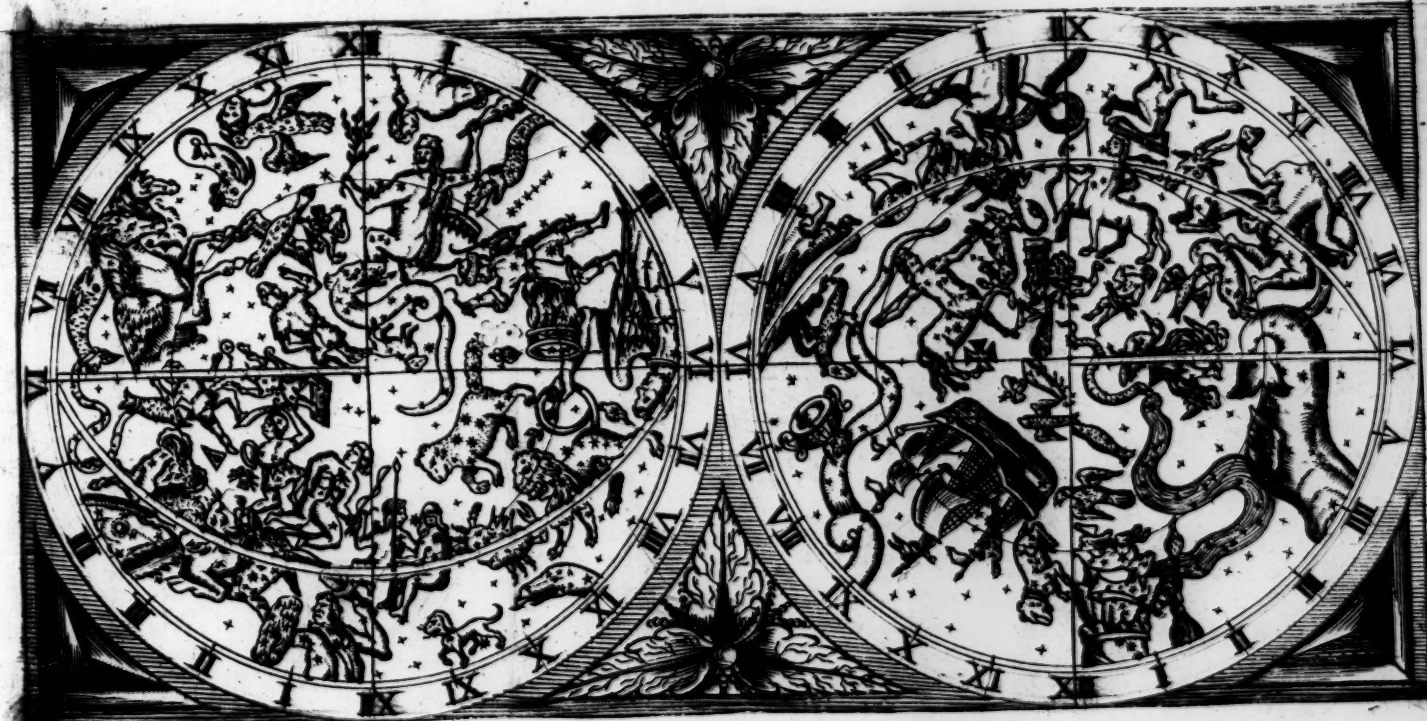
This 14 H. 46 m. taken from 24 00
Leaves 9 14

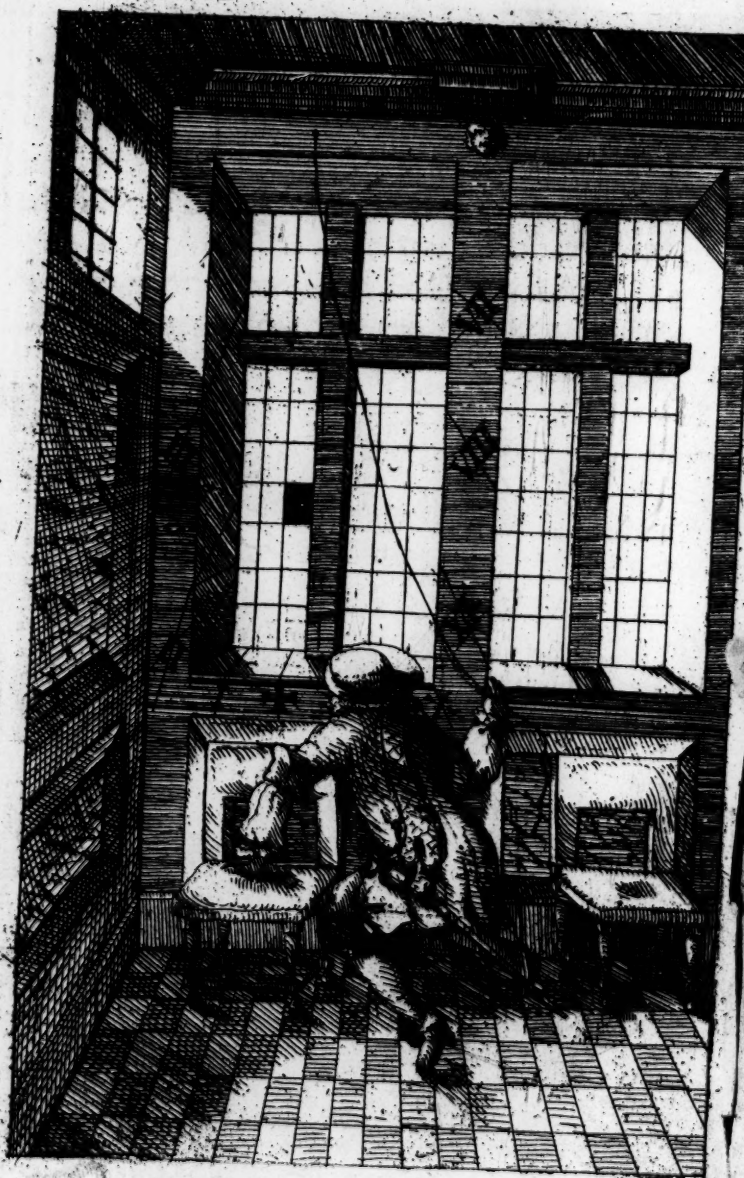
Which is the *Stars Nocturnal* Arch.

Variety of *Examples* might be added: But,

Usus optimus Magister.











A
CATALOGUE
OF ALL THE
CONSTELLATIONS:
Wherein in distinct Columns,
the Latin, Greek, Arabic,
and Caldee Names answer
to the English.



The Twenty - Three

Northern CONSTELLATIONS.

English.

Latin.

1. **T**HE Lesser constellation of 20 Stars, seven whereof were much taken notice of by the Ancients under the name of *Septentriones*; the two Stars in the Bears shoulder, are call'd the *Guards*, from the Italian word *Guardare*, to behold, in regard they are so much observed by Navigators. This Constellation is distant from the Pole about 3 deg. 30 min.
2. The



NS.

elice

N

Greek.

Κυνοςέρα, φοίνικη.

*Arabic & Chaldee.**Alrucaba.*

English.

Latin.

2. The greater *Ursa Major*, *Megisto*
Bear, consisting of 56 *Parrhasis*.
 Stars, seven whereof
 which are in the tail
 and hinder part of
 the *Bear* we vulgarly
 call *Charles his Wain*, *planstrum*.
 in regard the 3 Stars
 in the tail of the *Bear*
 resemble a team of
 Horses, the rest that
 are in the wheels of
 a Wagon. This Con-
 stellation was first
 found by *Nauplius* an
 ancient *Greek* Mathe-
 matician, and Father
 of *Palamedes*.
3. The *Dragon*, *Draco* *Urago*.
Serpent, or *Snake*,
 consisting of 32 stars.
4. The *Ethiopian* *Cepheus*.
King, consisting of
 11 Stars, whereof
 one more eminent
 then

*Greek.**Arabic & Chaldee.*

ἄρκτος ἥλικη.

Aliot,

ἄμαξα.

ἀράκων.

Ras Aben.

κήφευς.

Alderaimim.

English.

Latin.

then the rest in the
right shoulder.

5. The Ox-driver, *Bubulcus*, *Custos*,
consisting of 28 *Erymanthidos* *Ursæ*,
Stars, one whereof, *Icarus*,
formerly accounted
unformed, between
the leggs of *Boötes*,
is called by the
Greeks, *Arcturus*,
from its vicinity to
the great Bear, which
in Greek is *Arctos*.

6. The Northern *Corona Borealis*,
Garland, consisting *Septentrionalis*
of 8 Stars. *Gnossia*,
Ariadnes.

7. The Kneeler, *Ingeniculum*, *Genicu-*
consisting of 28 stars. *lator*, *Genu nixens*,
Hercules, *Saltator*,
Cateus, *Nessus*.

8. The Harp, o- *Lyra*, *Vultur Cadens*,
therwise called the *Falco*, *Tympanum*,
falling Grype, or *Fidicula*,
Vul-
ture, sometimes the
Falcon,

Greek.

Arabic & Chaldee.

Alderah Jehmin.

ΒΟΩΤΗΣ.

Ἀριτῆρος.

Alrameck, Azimech.

Στέφανος βορείαιος.

Ἀριόδινος.

Ἐγλόνασιν.

Algethi, Arace.

Λύκη, χίλος.

Alohone, Alsang,
Brinesce.

English.

Latin.

Falcon, and by some the *Timbrel*, consisting of 11 Stars.

9. The *Swan*, consisting of 25 stars, counting the 2 unformed, and one new one in the Breast, discovered in the year 1600. but the most Eminent Star in this Constellation is call'd the *Hens bill*.

Olor, Cygnus, Milvius, Ciconia, Gallina.

10. The *Wife of Cepheus*, consisting of 46 Stars, whereof that in the Breast is particularly noted.

Rostrum Gallinae.

11. The *slayer of Medusa*, consisting of 33 Stars, whereof 2 unformed; one of the principal Stars is call'd the head of *Medusa*.

Persens, Danaes Filius.

Caput Medusae.

12. The

Greek.**Arabic & Chaldee.****Κύνος, ὄρεως.****Adigege,****Κασσιόπεα.****Albirto.****Schedir.****Γέρεως.****Algenib, Chelub.****Ras Algot.**

English.

Latin.

12. The Waggoner, consisting of 27 stars, in the left Shoulder of *Auriga* is a noted Star, call'd the Goat, and a little beneath as it were in the Hand 2 others call'd the Kids.

Auriga, Bellerophon, Erichthonius, Orsilochus, Hippolytus, Myrtilus.

Hircus, Capra.

Hædi.

13. The Serpenter, consisting of 37 Stars.

Serpentarius, Hercules, Anguitenens, Anguiger.

14. The Serpent, consisting of thirteen Stars.

Serpens, Anguis.

15. The Arrow or Dart, consisting of 8 Stars.

Sagitta, Telum, Dæmon, Meridianus.

16. The Eagle, by some call'd the flying Grype or Vulture, consisting of 12 stars.

Aquila, Vultur volans.

17. The Minion, consisting of 7 Stars, which were heretofore

Antinous.

Greek.

Arabic & Chaldee.

Ἡνίοχος.

Ἡλιος Ὀλένη.

Alhaiot.

Ἐριφοι.

Ὀφισῆχος.

Alangue.

Ὀφεις, ἔγχευς.

Ὀισὸς.

Αἶτος.

Alcair.

Ἀντίνοος.

*English.**Latin.*

fore accounted only
so many unformed
Stars belonging to
the Constellation of
the *Eagle*.

18. The *Dolphin*, *Delphinus, Arionis,*
consisting of 10 Stars. *Veſtor.*

19. The *Little Horse*, or *Fore-horse*, *Equiculus, Caput Equi,*
consisting of 4 Stars. *Equulens, Equi*
Seſtio, Hinnulus.

20. The *Flying or Winged Horse*, con-
sisting of 23 Stars. *Equus Alatus.*
Bellerophontis.
Volans.
Gornius.

21. The *Deliver'd Virgin*, consisting of
23 Stars. *Nividius*
Denominates this
Constellation from
Alexandra the Vir-
gin, deliver'd by St.
George from the Dra-
gon.

22. The *Triangle*, *Triangulum.*
consisting of four
Stars. 23.

Greek.

Arabic & Chaldee.

Δελφίς.

Ἰππάριον.

Ἰππος περωτός.
Γήλασος.

Enīrb Alpharas.

Ἀνδρομύλη.

Δέλτων.
Δέλτα.

English.

Latin.

23. The *Hair of Coma Berenices*.
Berenice, consisting *Cincinnus*, *Casaries*,
 of 14 Stars, which *Trica*.
 were heretofore ac-
 counted as only be-
 longing to the Sign
Leo, and more espe-
 cially 3 of the 8
 unformed Stars of
 that Sign had this
 denomination.

The 12 SIGNS of the ZODIACK.

1. **T**He *Ram*, con- *Aries*, *Phryxium vel-*
 sisting of 21 *lus*.
 Stars. From the Star
 in the Head of the
Ram late *Astronomers*
 account the Longi-
 tude of all the rest.
2. The *Bull*, con- *Taurus*, *Vector Europæ*,
 sisting of 43 Stars. In
 the Back of the *Bull*
 are

Greek.

Arabic & Chaldee.

Κόμα Βερενίκης.

Γλόχαμος.

Κεῖος.

Ταῦρος.

*English.**Latin.*

are 7 Stars, commonly call'd in *English* the *Brood-Hen*, or *Seven Stars*; there are also 5 others in the *Face*, representing the letter *V*: The *Bulls Eye*. First observ'd by *Ptolomy*, afterwards by *Alphon-*
sus.

Atlantides, Pleiades, Vergiliæ, Sororum agmen.

Sucula.

Oculus Tauri, Hyantis Sydus, Palilicium.

3. The *Twins*, consisting of 29 stars; among the 7 unformed, one is call'd as plac'd next before the *Foot* of *Castor*.

Gemini, Castor & Pollux, Apollo & Hercules, Lampas Tyndaridum.

4. The *Crab*, consisting of 15 Stars. In this Constellation are 3, though small, yet noted Stars, and not uncelebrated by ancient Poets; the first call'd the *Crib*,
Stable,

Cancer.

Præsepe.

Greek.

Arabic & Chaldee.

Ἀτλαντίδες, πλείονες,
Ἀθροαί.

Ἰαδες,
λαμπάδιας.

Aldebaran.

Ἀνελμοί.

Anhelar.

Κάρινος.

κάτι.

*English.**Latin.*

Stable or *Stall* for
Cattle ; the other
two the *Affes*.

Aselli, Asinus Australis & Borealis.

5. The *Lion*, consisting of 40 Stars, in the breast of this Sign is a notable great and refulgent star, call'd by some the *Lyons heart* ; by others, the *Viceroy*, or little *King* : There is also another noted Star in the tail of the *Lion*.

Leo, Sydus Cleonauum.

Cor Leonis, Regulus.

Cauda Leonis.

6. The *Virgin*, consisting of 39 stars, of which 6 have been heretofore accounted unformed. In her right Wing there is a Star of principal note, call'd the *Gatherer of Grapes* ; another in her left hand call'd the *Ear of Corn*.

Virgo, Astraea, Erigone.

Vindemiatrix.

Spica Virginis, Arista Sacra.

Greek.

Arabic & Chaldee.

*Ονοι, *Ονος ὄτιος, και
Βορειός.
Λέων.

Alezet.

Βασιλικός.

Calb Alezet.

Γάλαθνος.

Deneb Alezet.

Alaraph Almucedir.

*Αμπελος.

Alacel.

Σταχύς.

Alcimon.

*English.**Latin.*

7. The *Ballance*, *Libra*, *Jugum*.
consisting of 18 stars.

8. The *Scorpion*, *Scorpio*, *Nepa*.
consisting of 10 stars,
the principal where-
of is a great Star in
the breast, call'd the
Heart of the Scorpion. *Cor Scorpionis*.

9. The *Archer*, *Sagittarius*, *Semivir*,
containing 16 Stars. *Chiron*, *Arcipotens*,
Centaurus, *Crotus*,
Phyllirius, *Senex*.

10. The *Goat*, *Capricornus*, *Pan*,
consisting of 28 *Tyrannus*, *Hesperia*
Stars. *unda*.

11. The *Water-* *Aquarius*, *Ganymedes*,
man, consisting of *Hyraea proles*.
41 Stars.

12. The *Fishes*, *Pisces*.
consisting of 36 Stars.

The fifteen Southern Constellations.

1. **T**he *Whale*, *Cetus*, *Balena*, *Pi-*
consisting of *strix*.
21 stars. 2. The

Greek.

Arabic & Chaldee.

ζύγος, χέλι.

Σκόρπιος.

Alatrab.

τοξότης.

Antares Calb Alatrab.

Αιγόνερος.

Algedi.

Υδροχόος.

Ίχθυες.

Κήτος.

Mençar.

English.

Latin.

2. The Boaster of Orion, Jugala.
his Might, consisting
of 62 Stars: In the
Girdle of Orion, are
eight bright Stars,
vulgarly call'd Our
Ladies Wand, or the *Cingulum Orionis.*
Golden Yard.

3. The River, *Fluvius*, *Padus*,
consisting of 19 stars. *Eridanus*, *Nilus*.

4. The Hare, *Lepus*.
consisting of 13 stars.

5. The greater Dog, *Canis Major*, *Sirius*.
consisting of 13 stars.

6. The lesser Dog, *Canis Minor*, *Canicu-*
la, *Antecanis*, *Mera*,
consisting of 5 Stars. *Erigonæa stella*.

7. The Ship Argo, *Argo Navis*, *Cymba*
consisting of 41 stars, *Theffala*, *Puppis*
in one of the Oars of *Æmonia*, — *Pega-*
this Ship is a noted *sea*, — *Jasonia*,
Star call'd *Canopus*. — *Palladia*.

8. The Hyde, or *Hydra*.
Snake, consisting of
24 stars, whereof 2
unformed, 9.

Greek.

Arabic & Chaldee.

Algenſe.

*Οριων.

Bed Algenſe.

Γοταμὸς.

*Αγγελος.

Σείγιος.

Alhabar, Aliementi,
Akchecher.

Γρόκκων.

Algomeiſa, Alſchere.

*Αργω.

Shemuel, Subel.

*Υδρα.

English.

Latin.

9. The *Cup*, or *Crater*, *Vas*, *Patera*,
Water pot, consisting of 8 Stars. *Urna.*

10. The *Crow*, *Corvus*,
 consisting of 7 Stars.

11. The *Centaur*, *Centaurus*, *Chiron*,
 consisting of 37 Stars. *Tryphon.*

In the hinder feet of
 this Constellation is a
 company of Stars,
 which in regard they
 appear to the Mari-
 ners in form of a
 cross, are call'd the
Crossers; also in the
 garnish of the *Cent-*
taurs *Spear* are four
 Stars, accounted by
Proclus a particular
 Constellation, and
 call'd the *Spear en-* *Thyrilochus.*
compass'd with Vine-
leaves; but by *Co-*
pernicus and *Clavius*,
 the *Centaur's Buckler*,
 from

Greek.

Arabic & Chaldee.

Κρατήρ, Καλπή.

Κόραξ.

Χείρων.

θυρίλλοχος.

English.

Latin.

from a mistake in the
old Translation of
Ptolomie.

12. The *Wolf*, *Lupus*, *Fera*.
consisting of Nine-
teen Stars.

13. The *Altar*, *Ara*, *Lar*, *Thuribu-*
lum, *Sacrarium*.
Stars.

14. The Southern
Crown or *Garland*, *Corona Austrina*.
consisting of thirteen
Stars; it is other-
wise call'd *Ixion's-* *Rota Ixionis*.
Wheel.

15. The southern
Fish, comprehending *Piscis Austrinus*.
12 Stars, whereof
the most noted and
principally observed
by the *Arabian A-*
stronomers, is that
in the Mouth.

The

Greek.

Arabic & Chaldee.

Λυκός.

θυματοήριον.

Ὁράνισκος.

Στέφανος νοτίος.

Ψιχθός νοτίος.

Formahant.

*The Twelve late-discovered Constel-
lations toward the South Pole.*

English.

Latin.

1. **T**He Crane, *Grus*.
consisting of
13 Stars.

2. The Phœnix, *Phœnix*.
containing 15 Stars.

3. The Indian, *Indus*.
containing twelve
Stars.

4. The Peacock, *Pavo*, *Avis Junonia*.
containing 23 Stars.

5. The Indian *Avis Indica*.
Bird, containing 11
Stars.

6. The Bee or Fly, *Apis*, *Musca*.
comprehending 4
Stars.

7. The Chameleon, *Chameleon*.
containing 10 Stars.

8. The

Greek.

Arabic & Chaldee.

Γέρας.

Φοῖνιξ.

Ἰνδός.

Ταῶς.

Ὅρις Ἰνδική.

Μέλισσα, μυῖα.

Χαράιλεαν.

English.

Latin.

8. The *Southern Triangulum Australe*,
Triangle, consisting
of 5 Stars.

9. The *Flying Fish*, *Piscis volans*, *Passer*,
or the *Sparrow*, com-
pos'd of 7 Stars.

10. The *Sword- Xiphia*.
Fish, in *Spanish*, call'd
Dorado, containing
7 Stars.

11. The *American Anser Americanus*.
Goose, call'd *Tocan*,
consisting of 8 Stars.

12. The *Water- Natrix, Hydrus*.
serpent, compos'd of
21 Stars.

To these may fitly be added one Constel-
lation more, (for it contains one very
bright Star, and another lesser near it,)
from the late Observation of Sir Charles
Scarborough, being to be seen towards the
Artick Circle, between *Ursa Major*, *Boötes*,
and *Coma Berenices*: It is figur'd representing
a *Crown'd Heart*, and by the Discoverer
Nam'd *Cor Caroli*.

Greek.

Arabic & Chaldee.

Τρίγωνος Νότιος.

*Ιχθυς Πτερωτός.

Χιφίος.

Χην Ἰνδικός.

*Υδρας.

Καρόλ & Κέα.

FINIS.



ERRATA.

P Age 2. Col. 1. lin. 1. after lesserr. Bear:
pag. 4. col. 2. lin. 2. after *Megisto*, a
Comma. Ibid. Col. 2. after *Draco*, a Comma.
Pag. 6. Col. 2. l. 3. after *Custos* leave out
the Period. Pag. 12. Col. 2. l. 6. after
Arionis leave out the Comma. Pag. 16.
Col. 1. l. 7. after the Colon, r. the principal
whereof is call'd. Ibid. Col. 1. l. 15. after
call'd r. *Propus*.





Bear:
sto, a
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